

DANIELLE CYRENE HUTCHISON

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EDUCATION AND TRAINING

Postdoctoral Appointee Sept 2021 - Present

Argonne National Laboratory, Lemont, IL

Postdoctoral Research Associate Jan 2020 – Sept 2021

University of Notre Dame, Notre Dame, IN

Ph.D. in Inorganic/Materials Chemistry 2019

Oregon State University, Corvallis, OR

3.91 GPA

B.S. in Chemistry with a concentration in Biochemistry 2014

Minor in Physics

St. John Fisher College, Rochester, NY

Magna Cum Laude 3.74 GPA

AWARDS AND SCHOLARSHIPS

Best Oral Poster Presentation – FMOCS VI Conference 2019

David P. Shoemaker Memorial Fellowship – OSU 2019

Milton Harris Summer Research Fellowship – OSU 2018

OSU Chemistry Department Travel Award 2017

Natural Sciences Award – St. John Fisher College 2014

Excellence in Research – Virginia Tech REU 2012

St. John Fisher College Science Scholars Program 2010 – 2014

St. John Fisher College Dean's List 2010 – 2014

RESEARCH EXPERIENCE

Postdoctoral Research – Argonne National Laboratory Sept 2021 – Present

Postdoctoral Research – University of Notre Dame Jan 2020 – Sept 2021

Structural characterization of actinide materials at high pressure

Supervisor: Dr. Peter Burns

- Analyzed pressurized actinide materials within a diamond anvil cell (DAC)
- Characterized structures of materials at high pressure using single crystal x-ray diffraction, powder x-ray diffraction, and Raman spectroscopy
- Funded by NNSA Actinide Center of Excellence (ACE)
- Mentored one undergraduate student in high pressure techniques

Graduate Research – Oregon State University Sept 2015 – Dec 2019

Synthesis and solution characterization of metal-oxo photoresist precursors

Advisor: Dr. May Nyman

- Developed new synthetic methods for sodium- and calcium-centered butyltin Keggin ions and crystallized four new structures. These clusters have been successfully deposited as thin films and used for nanolithography applications
- Solution characterization of butyltin clusters and hafnium/zirconium clusters by small angle x-ray scattering, electrospray – ionization mass spectrometry, and multinuclear NMR (^1H , ^{13}C , ^{23}Na , ^{31}P , ^{119}Sn)
- Graduate research assistantship funded by NSF Center for Sustainable Materials Chemistry (CSMC). Part of collaborative research projects across several universities and disciplines of materials chemistry and engineering
- Caretaker of Small Angle X-ray Scattering (SAXS) instrument – one of the most important instruments in the group. Responsible for training users, instrument maintenance and minor repairs, and periodic alignment of the x-ray beam
- Mentored one undergraduate student. Taught lab synthesis techniques and characterization (SAXS, IR, NMR)

Undergraduate Research – St. John Fisher College

Sept 2013-May 2014

Synthesis of novel zirconium complex catalysts toward the synthesis of multiblock copolymers

Advisor: Dr. Bradley Kraft

- Synthesized moisture-sensitive organometallic compounds using an oxygen- and moisture-free glove box and Schlenk line. Characterized compounds using multinuclear NMR (^1H , ^{13}C , ^{29}Si)

NSF Summer REU Program at Virginia Tech

May – Aug 2012

Synthesis and characterization of poly(ethylene oxide) – poly(ethyl oxazoline) diblock copolymers

Advisor: Dr. Judy Riffle

- Worked to improve yield and purity of diblock copolymers. Gained experience using Schlenk line and NMR characterization as well as organic synthesis techniques

SELECTED PUBLICATIONS

“High pressure behavior of calcium uranyl triperoxide”. **Danielle C. Hutchison**, Peter C. Burns. *JACS*, in preparation.

“Differentiating Zr/HfIV Aqueous Polyoxocation Chemistry with Peroxide Ligand”. James A. Sommers, **Danielle C. Hutchison**, Nicolas P. Martin, Lauren Palys, Jenn M. Amador, Douglas A. Keszler, May Nyman. *Inorg. Chem.* 2021, 60 (3), 1631–1640.

“Isomerization of Na-Centered alkyltin Keggin clusters”. **Danielle C. Hutchison**, Rachelle M. Smith, May Nyman. *Eur. J. Inorg. Chem.*, 2021, 43-49.

“Effect of Ambient Conditions on Radiation-Induced Chemistries of a Nanocluster Organotin Photoresist for Next-Generation EUV Nanolithography.” J. Trey Diulus, Ryan T. Frederick, **Danielle Hutchison**, Igor Lyubintsky, Rafik Addou, May Nyman, Gregory S. Herman. *ACS Appl. Nano Mater.* 2020, 3 (3), 2266–2277.

"Butyltin Keggin Ion with a Rare Four-Coordinate Ca Center". **Danielle C. Hutchison**, Rebecca D. Stern, Lev N. Zakharov, Kristin A. Persson, May Nyman. *Inorg. Chem.* 2020, 59 (5), 2900–2909.

"Peroxide-promoted disassembly-reassembly of Zr-polyoxocations" James A. Sommers, **Danielle C. Hutchison**, Nicolas P. Martin, Karoly Kozma, Douglas A. Keszler, May Nyman. *J. Am. Chem. Soc.* 2019, 141 (42), 16894–16902.

"Alkyltin Keggin clusters as EUVL photoresist technology," Rebecca D. Stern, **Danielle C. Hutchison**, Morgan R. Olsen, Lev N. Zakharov, May Nyman, Kristin A. Persson, Proc. SPIE 11147, International Conference on Extreme Ultraviolet Lithography 2019, 111471L (26 September 2019).

"Effect of Oxygen on Thermal and Radiation-Induced Chemistries in a Model Organotin Photoresist." Ryan T. Frederick, J. Trey Diulus, **Danielle C. Hutchison**, May Nyman, Gregory S. Herman. *ACS Appl. Mater. Interfaces* 2019, 11 (4), 4514–4522.

"Ambient-Pressure X-Ray Photoelectron Spectroscopy Characterization of Radiation-Induced Chemistries of Organotin Clusters", J. Trey Diulus, Ryan T. Frederick, Mengjun Li, **Danielle C. Hutchison**, Morgan R. Olsen, Igor Lyubinetzky, Liney Árnadóttir, Eric L. Garfunkel, May Nyman, Hirohito Ogasawara, Gregory S. Herman. *ACS Appl. Mater. Interfaces* 2019, 11 (2), 2526–2534.

"Alkyltin clusters: the less symmetric Keggin isomers", **Danielle C. Hutchison**, Rebecca D. Stern, Morgan R. Olsen, Lev N. Zakharov, Kristin A. Persson, May Nyman. *Dalton Transactions*, 2018, 47 (29), 9804–9813.

"Novel Sn-based photoresist for high aspect ratio patterning," Mengjun Li, Viacheslav Manichev, Fangzhou Yu, **Danielle Hutchison**, May Nyman, Torgny Gustafsson, Leonard C. Feldman, Eric L. Garfunkel, Proc. SPIE 10586, Advances in Patterning Materials and Processes XXXV, 105860K (13 March 2018).

"Surface characterization of tin-based inorganic EUV resists," Ryan T. Frederick, J. Trey Diulus, Igor Lyubinetzky, **Danielle C. Hutchison**, Morgan R. Olsen, May Nyman, Gregory S. Herman, Proc. SPIE 10586, Advances in Patterning Materials and Processes XXXV, 1058607 (13 March 2018).

"Alkyl Keggin Clusters Templated by Na", Sumit Saha, Deok-Hie Park, **Danielle C. Hutchison**, Morgan Olsen, Lev Zakharov, David Marsh, Sara Goberna-Ferron, Ryan Frederick, John Trey Diulus, Nizan Kenane, Gregory Herman, Darren Johnson, Doug Keszler, May Nyman. *Angewandte Chemie*, 2017, 56(34), 10140–10144.

SELECTED PRESENTATIONS

"Elucidating reaction pathways for zirconium and hafnium peroxide clusters", **Danielle C. Hutchison**, James A. Sommers, Nicolas P. Martin, May Nyman. Virtual oral presentation delivered at BAM-UBFC Materials Science Symposium, May 2021.

“Exploring solution behavior of alkyltin photoresist precursors”, **Danielle C. Hutchison**, May Nyman. Oral on-demand presentation delivered at ACS Fall Virtual Meeting, August 2020.

“Synthesis and solution characterization of alkyltin Keggin clusters”, **Danielle C. Hutchison**, Morgan R. Olsen, May Nyman. Poster presentation delivered at FMOCS VI, Corvallis, OR, August 2019.

“Good SWAXS(!) from molecular metal-oxo clusters”, **Danielle C. Hutchison**, May Nyman. Oral presentation delivered at SAXSexcites International SAXS Symposium in Graz, Austria, September 2017.

“SWAXS characterization of deposition and development solutions for nanolithography”, **Danielle C. Hutchison**, Rose Ruther, Sara Goberna-Ferrón, Douglas A. Keszler, May Nyman. Poster presentation delivered at SAXSexcites International SAXS Symposium in Graz, Austria, September 2017.

“Synthesis and characterization of butyltin γ -Keggin ion”, **Danielle C. Hutchison**, Morgan R. Olsen, May Nyman. Oral presentation delivered at the Northwest Regional Meeting (NORM) of ACS in Corvallis, OR, June 2017.

“Elucidation of organotin speciation”, **Danielle C. Hutchison**, Morgan R. Olsen, May Nyman. Poster presentation delivered at the 253rd National Meeting of the ACS in San Francisco, CA, April 2017.

“Synthesis of novel zirconium complex catalysts toward the synthesis of multiblock copolymers”, **Danielle C. Kellogg**, Bradley M. Kraft. Oral presentation delivered at the Rochester Regional Undergraduate ACS Symposium in Rochester, NY, April 2014.

TEACHING EXPERIENCE

Graduate Teaching Assistant

Sept 2015-July 2016

Oregon State University

Teaching assistant for undergraduate general chemistry for non-science majors and science majors

Grade Potential Tutoring

Jan– June 2015

Bremerton, WA

Tutored middle and high school students in algebra, geometry, and trigonometry

Chemistry Tutor

Sept 2011– May 2014

St. John Fisher College

Provided assistance to students taking General Chemistry at St. John Fisher College

MEMBERSHIPS

American Chemical Society

2017-Present

OUTREACH

OSU Discovery Days

Spring 2016

Volunteered at chemistry station to give local elementary school students hands-on experience with “chromatography” art, and liquid nitrogen and dry ice demonstrations

LEADERSHIP EXPERIENCE**FMOCS VI Conference Organizer****2019**

Oregon State University

Head of swag committee

Organized conference food

Co-Leader of Student Nanopatterning Group**2017-2019**

Oregon State University – Center for Sustainable Materials Chemistry

Responsible for organizing bi-monthly student research meetings and presenting results to faculty

Director of Musical “Edges” for Fisher Players Drama Club**2012**

St. John Fisher College

One of two co-directors – responsible for teaching stage performance and vocal technique

Treasurer of Fisher Players Drama Club**2011-2013**

St. John Fisher College

Managed finances for Fisher Players, a performing arts club